Interviewee 1

I worked at Atomics International (AI) beginning in 1958, but I was never "assigned to the hill" while working for AI. I was on the hill while working for Rocketdyne in 1965 at a research facility located just past the entrance gate. I was not in any of the test facility areas.

I did work a few times at Building 4093, the AE-6 reactor. There was a nuclear reactor there and because I was a licensed reactor operator I went up there just a couple of times to run the reactor. It was sub-critical at the time. As I recall, they were running experiments on the core and they needed a licensed reactor operator at the console. This was probably prior to 1965, probably 1963 or 1964. I was licensed on the L77 reactor, which was a little reactor operator down at headquarters. We were running some experiments for the SNAP program and we were also teaching for the SNAP reactor. It was a prerequisite for people to run the SNAP reactor. People had to become licensed through the AEC and they would go through a testing program with us. This was all down at DeSoto.

I was up to the hill a few times for an experiment when I first went to work probably in 1959 or 1960, I was working on a project called radiation fuel gage. The purpose of that was to place nuclear sources around fuel tanks for airliners. Various tanks were up on the hill that we would work on, but I can't remember where this area was located. I worked on this program at the Rocketdyne facility off of Van Owen, at the DeSoto facility, and then at SSFL. The facility at SSFL was outdoors. There was a building area and there was a blacktop area outside where we worked. After that I went and became a licensed reactor operator for the L77 reactor at DeSoto. We did training with the SNAP reactor people and also at that time I was doing experiments pertaining to radiation effects on electronic circuits. We had a flash x-ray machine and we would simulate gamma explosions from nuclear weapons and the effects it would have on electronic circuits like guidance missiles. That was all done at DeSoto.

Going back to the AE-6 reactor, I would be at the console because they needed a licensed reactor operator. The console was separated from the reactor core by a wall or building or something. I would essentially just run the reactor. As I recall, it was all subcritical. I would just run it up a little bit and they would do their experiments or move things around. I don't really know what they were doing. I think it was an open core with graphite. I ran the controls one or two times for about a half-day. It wasn't a part of my everyday routine. My time on the hill was very limited.

The radiation fuel gauge project used cobalt-60 (Co-60). The Co-60 sources were small, but we used a lot of them. We placed them all around tanks of various shapes and sizes. We would fill the tanks with water and try to get readouts with Geiger counters. Then we would rotate the tanks and see how the results changed. I remember starting off with a squared-off tank that was perhaps 3 to 4 feet high. I think I tested this tank for 6 months with various configurations of the Co-60 sources. The only thing I ever used was water in those tanks. We didn't test a lot of

tanks, but we tested a lot of source configurations. It was really boring. You would set up the sources on a tank and run a test and maybe that would take an hour or two and then you would move the source around. I'm sure I was doing other things too. I can remember building some circuitry. You did a lot at AI, there were various programs and you did a little of this and a little of that. I didn't set up a test and then leave though, especially when you had radioactive sources, you wouldn't leave those out. You had a lead-line container, a "pig," where you would store the radioactive sources. After you ran your test, you put all your sources away. This testing was a one man job, I was the one placing the sources on the tank and putting them away. I was told were to place the sources and guided by people who knew what was going on. I was a tech at this time and not that familiar with the nuclear field. I had an engineer that told me were to put the source and which tests to run. I would also collect the data and so some analysis. I can't recall how I stuck the sources on, I don't know if there was some kind of magnet or tape. That was my first project at AI and it was not a very exciting project. Eventually the project lost its funding. I can't remember if it was outside funding or internal. We had outside contracts and internal projects that were funded by AI.

I am not aware of the disposal practices at SSFL.

We had always been trained in the proper handling of radioactive materials. We had film badges that were used for exposure over time and dosimeters for immediate readout. They were like pencils and you could read them directly to see if you had been exposed to radiation.

My feeling about the company was that they were always very careful. They made sure you understood what you were doing. They had classes of their own for safety and other technical issues. For the licensing of the L77 reactor, we were sent to a UCLA extension program for nuclear engineering. The company was keen on education and making sure people knew what they were doing.

My boss and I were trained by a guy that had been running the L77. His training for us was essentially explaining to us which switches to hit and what gauges to look at. When the AEC came out to check our training, my boss and I both failed their test. Needless to say our initial training was not up to par. We were then sent to the UCLA extension program so the next time we were tested we easily passed. AI always tried to do right by their employees as far as I saw.

I am not aware of any issues with drainages, septic tanks, or leach fields. I never heard any rumors of anything being done that shouldn't have been done. You would have to talk to people that were assigned to dealing with the disposal of radioactive waste.

After I came back from Rocketdyne, I was assigned to a project that involved analyzing moderator material from the Organic Moderator Reactor (OMRE). AI had two reactors they were doing research on, the SRE and the OMRE. We were very careful in disposing the material we analyzed.

Areas at SSFL that EPA may want to look at for its sampling efforts are the burn area and the hot cell. I would assume the SRE area would be one of particular interest. The question is, "How clean do they want to get this area?" If you want to clean the site up to a pristine level then I guess you would remove the whole mountain. I would think for the people that live in the West Valley or on the Simi side that the TCE issue is more of a problem. I would think solvents like TCE would migrate more readily than radioactive material. But I am not an expert.

I have heard there are are certain areas in Simi with higher cancer rates, and some eye problems in the West Valley. You just don't know what to think.

Later on there were more buildings and more people, but he only people I interfaced with were AI personnel.

I was not aware of and did not see, but I have heard secondhand that during the cleanup of the SRE, some people did not wear their film badge because they would have exceeded their exposure limits.

I was not aware of any incidents with the AE-6 reactor. I don't know why I was even running that reactor, if it was because someone was sick that day or some other reason. I had no history with the reactor or anything like that.

I have heard some people say that we were never told about the SRE and that is not true. As far as I know, it was an open subject and there was no attempt to cover it up. I didn't know about it exactly when it happened, but shortly after I was aware of it. I don't know if the surrounding community was made aware of it, but those of us that worked there were aware of it. I wasn't really that concerned because I wasn't working on the hill regularly, but there was never anybody telling us not to talk about it. I know there were people in the company that weren't aware of it at the time though. I can only speak for myself, but it wasn't a big secret and we talked about it.

I was never told to do anything I felt was wrong. I was well trained. I did what they asked me to do. I don't have any complaints.

Interviewee 2

I received my Ph.D. in physics from the University of Illinois in 1951 and my thesis was on the radioactive decay of ruthenium. I have worked as a Nuclear and Instrumental Engineer in various firms. I spent one year as a professor of physics at the University of Arkansas, but I don't think I was any good at it. I think you were here to ask me specifically about my experience at Atomics International (AI). I started at AI in November 15, 1955. I was laid off in 1965 or 1966 and was transferred to Rocketdyne. Then there was another lay off. In March 1968, I changed companies and worked for the Garret Air Research Manufacturing Division working on separating heavy and light uranium. I retired from Garret at the end of March in 1989.

The nuclear experience I had at the Garret Air Research Division had to do with designing and building centrifuges for separating heavy and light uranium.

At AI, I was an engineer in the instrumentation group involved in measurement devices. I worked on the development of an automatic shutdown device or fuse for a power reactor, which eventually led to a patent that was taken out after I left the company. Most of my time was spent at the Van Owen and DeSoto facilities. I spent very little time at Area IV on the hill, maybe a day at a time here and there. I do remember doing some work on the hill at the KEWB reactor. I remember testing a piece of electronic equipment with a pulse of nuclear radiation from the reactor. The KEWB reactor is a water boiler reactor, which is essentially a big pot with water and a solution of uranium in it. If you pull the control rod part of the way it, the reactor goes critical and starts to generate power. If you pull the control rods all of the way out, the reactor goes supercritical and then "poof." It explodes and puts out a lot of nuclear radiation in a very short time and then of course it shuts itself down automatically. Then you have to wait 45 minutes before you can set it up again. I spent one day doing that. We eventually discovered a much easier piece of equipment to use for our tests that gave equally useful results to the reactor, it was a flash x-ray machine. We had the flash x-ray machine at DeSoto. It doesn't rely on a nuclear reactor. It is an x-ray tube with a cold cathode. The cathode has a lot of tiny spikes on it to generate intense electric fields at the points of the spike and draw electrons out of the cathode. Then the electrons slam into an anode and generate x-rays. It was a lot simpler to use than the KEWB and cheaper as well.

I was a member of the reactor safety committee at Area IV. We evaluated safety issues with the SNAP 10 reactor. The SNAP 10 was a small reactor with no coolant. The idea was to use thermoelectric conversion of the heat from the core and turn it into electricity, which could then be used to run a military satellite. The way the reactor operated was that you had this core of uranium and graphite. Surrounding it were pieces of beryllium. Beryllium is a good moderator and reflector. When the beryllium was close to the reactor core it increased the amount of neutrons that would reflect back to it and make the reactor critical. If you pulled the beryllium away, the reactor became subcritical and shut down. The reactor didn't have control rods. The

beryllium was used as a moderator and a control device. I forget what they used for the thermoelectric equipment. The physical nature of the stuff was described as having all the strength of plaster, so it had to be held in compression, but it had a good coefficient. The reactor worked fine and the satellite was sent into orbit. It was shut down after a month or so because the rest of the satellite didn't work very well. As far as I know it's still up there circling the globe.

As a member of the reactor safety committee we tried to think of any potential issues that could arise and have a plan for dealing with them. The two big safety concerns we explored with the SNAP 10 rector had to do with shipping the reactor to Vandenberg Air Force Base and the potential for transportation accidents. We didn't want the truck carrying the reactor to crash into a gasoline truck. That would result in a big fire and the uranium in the reactor would burn up and spread and there would be a big radioactive mess all over. We persuaded the California Highway Patrol to not allow any gasoline trucks on the highway the day we were planning to move the reactor. The other potential transportation safety was if the truck tipped over and rolled into a ditch with water. If the reactor was in the water for a long period of time, the radiation could percolate into the water. I forgot what we decided to do about that other than make sure the truck driver was very careful. As far as I know, nothing happened to the SNAP 10 reactor and it made it safely to Vandenburg Air Force Base and was launched. It is still in orbit.

Another possibility was this. After 3,000 years the satellite is going to come back to earth. We postulated what would happen to it when it comes back. One fellow postulated that the very worst thing that could happen would be that the satellite landed in the middle of Rockefeller Center in New York City. Well, what could we do to prevent that? We excused ourselves from contemplating that scenario by saying that event would potentially occur 3,000 years from now and it wasn't our responsibility. I think we were pretty responsible. We thought about the first 3,000 years at least.

Going back to the scenario with the reactor in the water, the issue would be that radioactivity would get into the water and groundwater and be distributed that way. There wouldn't be too much in the air. A geologist or hydrologist could tell you more about the transport of radioactivity in water, I am not an expert in that. But I would imagine radioactivity travels faster in air than water. Dispersion of radionuclides depends on the chemical nature of the element, not the fact that its radioactive. As far as being concerned about any particular radionuclides, that is really outside my area of expertise that would be health physics. I would be concerned about that I can think of off-hand are cesium-137, cobalt-60, a radioactive isotope of barium, uranium and its daughter products, and a gaseous form of iodine. None of them are very nice.

Going back to my one day at the KEWB reactor, I remember that the technician that was supposed to make sure the cameras had film in them forgot to load the cameras and we missed

the first shot. We didn't get any data on our first pulse of the reactor. I was waiting outside the KEWB building when we ran a test. It was a safety precaution. We didn't want to be near the thing when it went "poof." We would set everything up and get it ready to go. I went outside. I don't know how they got the reactor to go off, maybe there was a timer or something. I don't remember that detail. Maybe there was a timer with a delay so that we could leave the building before the control rods were pulled out. The system would pull the control rods out then put them back in. When the control rod came out you would get this "explosion" and then you would drop the control rod back in and wait for things to cool down. Then you set it up and do it again. The measurements would be recorded on an oscillograph or camera. An oscillograph was an oscilloscope with a camera looking at it. The "poof" is the release of radiation from the removal of the control rod. The reactor liquid is completely contained in the tank, it just expands to a greater volume when the reactor goes supercritical. The KEWB itself was below grade level and the reactor itself was in the cellar of the building. This provided additional shielding. The KEWB was a stand-alone experiment and not related to the other experiments at the SSFL except that AI was running all of them. I don't recall what the other buildings surrounding the KEWB building were used for. I was doing this in 1964 or 1965, so it was at least 45 years ago. I left in 1966, and this was one of the last things I did before I left.

I did have another concern with the containment vessel of one of the SNAP reactors. The concern related to a nil ductility transition temperature. Carbon steel at low temperature is brittle, but at a high enough temperature it becomes non brittle. If you irradiate it, you change the crystal structure so that the temperature at which the steel become non brittle gets higher and higher. This is the nil ductility transition temperature, the point at which the steel goes from brittle to not brittle. Below this temperature the steel is not ductile, it will crack. Above this temperature, the steel is ductile and will bend a bit. In this case there is a containment vessel around the reactor and they wanted to be sure that when the reactor was operating the containment vessel was above the nil ductility transition temperature. They measured that with a couple of thermocouples attached to the containment vessel. One time there was a disagreement between two of the thermocouple readings and I had to make a decision regarding what to do about it. Which reading was the correct reading? For safety reasons, I said you would have to believe the lower reading, that the lower temperature was the nil ductility transition temperature. Later on after they took the thermocouples out they discovered that the thermocouple giving the lower number was the one that was accurate. So I was justified in my decision. I can't remember exactly which SNAP reactor this issue pertained to, maybe SNAP 8. The safety committee I was a part of was based at the DeSoto facility, but we would occasionally visit the hill for inspections.

While at Rocketdyne, I was based at the research center located not far from the entry gate. I was there full-time for about two years as I recall. It was a large building that had a lot of cubicles.

I don't recall handling any radioactive sources. For a while I was head of a small group of engineers and some of those engineers worked on the Radiation Fuel Gauge project which used cesium or cobalt sources, but I don't recall exactly where the testing took place. The idea of this project was that you placed radiation sources on an aircraft fuel tank such that you can measure the quantity of fuel in the tank regardless of attitude of the tank. Normally fuel gauges consist of probes stuck in the liquid of the tanks. They try to locate the probes so that when the gasoline what out of one probes range, another probe will pick it up. The Radiation Fuel Gauge project was supposed to be a simpler way of instrumenting the tank. You didn't have to put multiple probes into the tank, you could put radiation sources on the side of the tank. They worked on that for years and years, but never seemed to get anywhere. I don't know where the actual testing took place. I wasn't a part of the project, but a few of my engineers were.

I don't recall any disposal practices or any on-site disposal of radioactive waste. I only know what I have read in reports, but I didn't read that there was any disposal on the site. I do remember there was a plan to build a "Hot Laboratory" to reprocess fuel elements. I think they did build the Hot Laboratory, but I don't know if they developed the chemical processing to reprocess the fuel elements. I think at that time the U.S. Government decided not to reprocess the fuel elements; it was just cheaper to dispose of the spent fuel elements and buy new uranium. France takes a different approach because they don't have any uranium mines.

I have read accounts of what happened at the SRE. It didn't make any impression on me at the time so if I knew about the SRE incident at the time I had since forgotten about it. After reading these accounts, I can see why I would have forgotten about it because it wasn't really something people that worked there would have thought was unusual. It was an experimental reactor. You operate the reactor to find out what is wrong with your design. Well they found out one thing that was wrong with their design. The lubricating oil for the pump motors leaked into the sodium. This plugged up some of the coolant tubes. As a result, the fuel elements overheated and burst. This was a problem because we had to go in and fish the fuel elements out. It was a job to get them out and we had to develop special tools to do it. But it was the sort of thing we expected to happen because the SRE was not a finished design. We were experimenting and this was one of the things we found out we had to change. I'm not exactly sure how they fixed the issue with the lubricating oil, but it was fixed. Some people are insistent on calling this a partial meltdown, which does not seem correct to me. To me a partial meltdown would involve melting of the coolant tubes themselves so that the whole reactor core would have been useless afterward.

Meltdowns have happened in some reactors in the world and when it does the reactor in question is simply abandoned. There is no attempt to repair it because it is too dangerous to get close to. Dirt is thrown over it and you wait for 200 to 300 years before it will be safe to work on. This certainly did not happen at the SRE. They were able to continue running the reactor with the

damaged fuel elements. They finally realized something was wrong with the reactor and shut it down. I am familiar with this because I have read all the reports about the SRE incident.

Another thing that keeps coming up from time to time is the tritium in the water. For a long time I couldn't understand where the tritium was coming from because it has a half life of about 10 years and it has been maybe 60 years since any reactor was running up on the hill. I dug into it and finally figured out that tritium is created in the upper atmosphere - it is cosmic radiation and so it falls continuously. There is always a little bit of tritium around. It is a very soft beta emitter so it doesn't do much damage. You probably have a little tritium in you right now. It's always been around, it's just like you have carbon-14 in you that slowly changes to nitrogen and you have potassium in you that is slowing changing into argon. These have been around since the beginning of the earth. So 50 years ago if they found tritium, I would say maybe that's the result of a reactor, but 50 years later I would say detection of tritium would be the natural background that results from cosmic radiation.

I don't know anything about the sewers or drainages at the SSFL.

There wasn't much occasion to go to other building on the hill other than the buildings you were working on unless it was for a social call at lunch to play bridge or something. The SNAP program was quite separate from the SRE program. SNAP was funded by the Department of Defense and SRE was funded by the Department of Energy. There were even classification issues with the SNAP, as things were secrete, but there was nothing specifically secret at the SRE, it was intended for commercial use.

The company had one other reactor problem in Hallum, Nebraska. You may have heard about it. Using the design as SRE, the company contracted to build and put into operation and sodium-cooled reactor. They made one mistake. They didn't use the same design for the moderator cans that they used in the SRE. They went to a different design and the darn things split open. They ended up with sodium mixed in with the graphite and it was a big mess. They were given the choice between putting up $4 million to clean up everything or $8 million to fix everything. They chose the cheaper option and that was the end of the SRE program. Although lately, I read that someone has come up with a new design for a sodium-cooled reactor.

I think the most logical areas of concern at the site for EPA are the KEWB, SRE, and various SNAP reactors.

I know there are reports of groundwater coming from the hill that is radioactive. I don't know what kind of radionuclides are in the water. If it's simply H-3, I understand how that could be there from the cosmic radiation, otherwise I don't know. They may be some long-lived things still around from the soil being irradiated, but I just don't know.

There is also some hysteria associated with the whole site. There are a group of people that have been afflicted with cancer and they are convinced their cancer is a result of testing that occurred by North American Aviation, including the radioactive testing Atomics International and the rocket testing Rocketdyne did. Rocketdyne used various poisonous solvents. They were not very careful about how they disposed of stuff.

One of my jobs at Rocketdyne when I was there was to measure the distribution of droplet sizes of a spray. The spray was something that I am sure would give me cancer if I breathed it. I didn't get cancer from it, so it didn't hurt me. I don't know what they were using it for and I don't know why I was measuring the droplet distribution, maybe it was to figure out how it would burn in a jet engine. There was some peculiar geometry involved in measuring the droplet distribution. The way you would assess the droplet size was to not measure the individual droplets, but to make measurements on droplets that were coming close to some sort of probe and how you interpret the voltage variation in the probe as the droplets come near it. This involved some tricky mathematics that I needed help with.

With regard to industrial wastewater being used to water areas of the hill, I don't recall seeing any watering going on up on there. It was a desert and they just left it. We had to watch out for rattlesnakes though. One fellow said it was a good idea to wear high boots so if a snake strikes it will hit the boot and not your leg. I never ran across any when I was there, but they are quite common.

Interviewee 3

I was an operations engineer assigned to Facility while working for Atomics International (AI). I started as a forklift operator and at one time I was in charge of five test facilities. I was up there 35 years. The way that it worked at the Atomics International LMEC/ETEC side of the hill was that in a building or test facility you would have engineers that would be in charge of the engineering side of things. They would have all of their engineering staff. A project would come in and engineers would be assigned to the project, design engineers, electrical engineers, and a project engineer who would be in charge of the overall project budget. In each test facility you would have an operations engineer and then your operators; we called them operators and not mechanics. I was an operations engineer. The operations engineer would be in charge of that facility no matter what project was going on or what other group of engineers assigned to the project were going through. I never left my building, projects would come and go, but I would stay at the same building. I would be in charge of getting the project set up and operating it to whatever procedures were written. So we had a lot of input to how the procedures were written.

The operations engineers and the operators themselves were probably some of the most highly trained people you ever met. Out of a 40 hour week, we probably spent 8 hours a week in some sort of training. Training included topics such as hazardous material handling, water treatment, sodium handling, hydraulic oil safety, high pressure safety, and fire training. At one time I had my 40 hour hazardous material first responder certificate. I was a site manager and a first responder. All of my guys had the same type of training expect for the site manager training. These guys on the hill had so much training; we had enormous amounts of training. It was absolutely a requirement. We were always trained in any kind of regulatory requirements. We were always afforded the training and knowledge of the time. So they never held anything back from us, we knew what we were getting into with different projects. The company was very good about training.

I spent almost all of my employment from 1963 to 1999 on the hill. The only exception was for about 8 months when I worked in the fuel fabrication department at headquarters. I held various job titles at SSFL over my 35+ years including, forklift operator, mail boy, plutonium facility worker, and shift leader at the Sodium Components Test Instillation (SCTI) facility. I also worked in Building 13, the Earthquake Test Facility.

My first job was as a fork lift operator and heavy equipment operator. Materials would come up from headquarters on a truck and I would unload them, separate items base on their destination, and deliver the materials to the proper building. There were 5 of us that did that. Items would be packaged and have routing tags on them. It could be anything from a 500 piece of nickel to gaseous nitrogen in K bottles. At one time I had to unload a truck and load a truck every day for almost a year. And in each truck there would be 300 of those big gas bottles, 122 pounds each. They would be laying down, so I would have to go stand them up, roll two at a time, lay them down onto the forks, take them down and then pick up two more.

Then I was a mail boy dealing with secure mail, Q clearances and top secret clearances. Then I went from there down to headquarters for the fuel fabrication work. Then I came back up and worked at the plutonium facility. But it wasn't hot at the time, meaning there wasn't any fuel up

there. We were fabricating the building at the time and all the handling equipment such as the glove boxes, etc. Then I transferred to SCTI and I was there for about nine years. I was a shift leader at SCTI. The shift leader was like an operations engineer, he was in charge of a specific crew for a specific period of time. We worked a rotating shift – six days working the day shift (first shift), then a day and a half off, then seven days of second shift and two days off, then seven days of third shift with four days off. It will destroy your family life. I was doing that and going to school at the same time. After I left the SCTI they increased the power level to 70 megawatts of power and they actually supplied power to one of the local cities out here.

After SCTI, I transferred to Building 13 and that wound up being the earthquake test facility. It was also a stress intergranular analysis facility. We weld different pieces of metal together to form a pipe. Then we would put measurement devices on the pipe to measure within a millionth of an inch any movement. We would put the pipe in an oven and put six hydraulic jacks between the two ends and we had as much as 750,000 pound s of pressure and we would heat it up to 900 degrees and then shock it to 500 degrees within about 16 seconds and see what happened. Our tests in that facility wrote the books for the engineers. They didn't know what the breaking point of something was. We developed the statistics for the engineers to use in their designs. In Building 13 we got to break things and get paid for it. It was a good job. Before I worked there Building 13 was also the SNAP 8 and SNAP 10 assembly building. They modified the building later for the earthquake testing. I didn't work in Building 13 when it was a SNAP assembly building.

When I was a fork lift operator I hauled SNAP 8 and 10 fuels to a storage facility. I also hauled remnants from the SRE rupture to Building 64, "The Vault." I did not package the remnants; I just hauled the box from one area to another. I wore a film badge and dosimeter while doing this work though. In all the time I was down at headquarters working on fuel fabrication and on the hill, I never received a daily dose. Down at headquarter we had up to 750,000 dpm airborne contamination. You could see it floating. We knew what we were doing though.

Building 28 was the neutron flux generator reactor. I was a fork lift operator working at that building. They had to create a frame with lead shielding to put between me and the items I removed with the fork lift from Building 28. That was a neat building. They did things with mummies, motorcycles, and .45 caliber pistols. You could take a picture of a .45-caliber pistol and you could see the spring inside the gun, the bullets inside the clip, and the powder inside the bullets. They did a lot of mummies and stuff for colleges and universities. Rather than disturb the outer packaging of the mummy, they could look inside it. They even did a dinosaur head in Building 100. I moved things within the building because everything associated with the reactor was heavy.

As a forklift operator I would go to any building and pick up stuff and deliver it to where ever they wanted. I would pick up a lot of things and take them to the old disposal pit. The sodium disposal pit, "the pit" as we called it, was where they would take pipe that had been excised out of the sodium test facility and had some residual sodium in it. At 300 degrees sodium is a liquid, but as it cools it becomes solid. But get sodium wet and you get big burning explosions. I wanted to make a bomb for Vietnam out of the stuff. We would take sections of pipe out to the pipe, chain it down, and we had a steam boiler out there with steam lance and we would sit

behind a shield and steam the sodium out. It was the best way to get rid of the sodium. Or if we had smaller stuff we would throw it in the pit with water. So we took a lot of things up to the burn pit. One thing you are probably interested in is mercury. As far as I know, there was never anything radiological taken up to that burn pit. Radiological material was only taken to specific building with specific needs to have it. It was always loaded by procedure. Everything was always done by procedure, including all the smears and scans. Before I was even allowed to pick it up they would make sure I had my film badge and make sure all my training was current. They made us well aware of what we were doing. I transported waste material in "pigs" to Building 64, and sometimes to Buildings 21 and 22. I think an outside contractor took the waste from there to Beatty, NV. I am not sure what was ultimately done with the waste, I was just asked to move it.

We had the Apollo-sponsored spacecraft. A lot of people don't know that it had six discs that were 3 feet in diameter, some of them 6 inches and some 2 inches thick made out of depleted uranium at the bottom of that spacecraft. During launch if something went wrong, they could eject and this would help keep the capsule oriented until the parachutes came out. We liquefied the uranium, cast it in different configurations, and then coated it with epoxy resins so that the oxide wouldn't grow. It was the weight of these disks that kept the capsule in the proper orientation for deploying the parachutes.

Most files for Area IV, including as-built drawings, were stored in Building 57. So there should be records there for you to look at. Building 57 was part of ETEC, but as they started shutting things down it became a place to store filing cabinets and records. Building 57 was originally a SNAP 10 shipping container building. They would take a SNAP 10 after it had undergone all its shaker testing and everything was ready for flight. They would take it to Building 57 and open this gigantic can, like 25 feet long and 20 feet in diameter. They would take the top half off and put the SNAP 10 in a certain configuration monitoring it the whole time. Then they would close it up and I would go in as a forklift operator and put it on a truck.

Looking at a map of the site I can tell you the following building numbers and descriptions:

Buildings 13 and 59 were SNAP 10.
Building 19 was a SNAP 8 test facility and was a hot building.
Building 57 was the "canning building" for shipping.
Building 25 was a test facility for SNAP 10. This building I believe went hot.
Building 12 was a test facility for NaK.
Building 28 was the neutron flux generator.
Building 27 was the shaker table for the SNAP 10. There was nothing hot here.
Buildings 32 and 42 were sodium test facilities.
Buildings 20, 21, 22, 24, 25, 19, 59, 9, and 100 were all hot buildings.
Building 64 had a loading dock.

I went in the hot cell with the fork lift to take out the windows. They were very long and stair stepped with lead-impregnated quartz glass, white oil, then another layer of lead-impregnated quartz glass. Those windows weighed 6,000 pounds. There was not much room to drive around in there. They were changing the seals on the windows and that's why I was hauling the

windows around. The seals would deteriorate from exposure to the radiation. They had all kinds of stuff in that building like iridium and tritium.
I didn't really have a lot of exposure to radiological materials on the hill. My work with radiological material was primarily down at headquarters with the fuel fabrication there.

Building 64, "The Vault," was actually a very small building. It had this really neat thing, a scale. It was about 8 feet long, 4 feet high, and 3 feet deep. The scale had engraved glass sides with teakwood or hardwood components. It had a balance beam that was gold. It was from the Oppenheimer project and came out of New Mexico. It was used at the vault to weigh items. Building 64 had a standard loading dock.

At one time all of the buildings were down and we were still maintaining surveys of the facilities, collecting the film badges, checking the security of the facilities, making sure there was no water leaking, etc. I was in charge of a crew that did that. I can't think of any issues with pipes, sewers, or drainages that stick out. As far as any internal water leakage, we saw a few roof leaks, but I haven't heard of anything else. All the vaults had sump pumps to pump through filters and scanners, but I didn't have anything to do with that and never heard anything about issues with those pumps.

The only radiological accident I can recall was at the SRE. As far as SNAP 8, SNAP 10, ETB, ETB Annex, I never heard anything happening with those. As far as the plutonium facility, they went hot with plutonium, but when I was there I was just helping build the building. I never heard of any problems there after it went hot.

Building 100 and Building 9 had the "OMRE" and graphite reactor. They had all kinds of stuff going on there. They modified Building 100 so the roof pulls back and they could shoot a laser beam out of it and hit the moon. They left a target on the moon and they would shoot laser beams at it. I have no idea what they were testing. Building 9 and 100 were hot for a long time and they were hot when I was up there.

I was not really concerned about the hot buildings up on the hill. The only concern was for the deep pockets coming out of the valley looking for help with their maladies. There is someone claiming to have gotten cancer from the hill, but this person had cancer before even moving into town. There are guys that have died up there because of industrial exposure. One guy I know real well because I gave deposition to his case. That was for asbestos. We worked with a lot of asbestos. We even knew how to do field tests for lead, zinc, short-fiber asbestos, and long-fiber asbestos. You just had to have a lighter. As far as radiological issues, I never had concerns at the hill. I worked with hotter stuff down at headquarters.

Those guys in Buildings 20, 21, and 22 had all the hot stuff. If anyone was going to get any exposure those buildings are where it was going to happen. I know one guy that died, I don't know if it was from cancer from working at the site, but he used to work in Building 21 and 22.

We had a test facility called the water loop (Building 463, the hydraulic test facility). We tested sodium components. It was clear off in the boonies. We had three separate gigantic pumps and we could pump water through different configurations. We tried to stall pumps. We would have

a pump pumping water one way and then set up another to run the opposite direction to see if we could stall the pump. We had to make sure when we were doing a injection test for hypergolic fuel test. Rocketdyne hired us to do this. We built this big plastic box and we would shoot water through it. It had a laser array and as the water would go through we injected phenylthaline though it. It would react with lasers and you could see it, so they videotaped it. So they could see if they were getting homogenous mixing. It was a test for fuel development, but we using water first. We had all this effluent containing phenylthaline and to test for it we would dump some water into three 5-gallon jugs and put goldfish in there. If the goldfish hadn't died in three days we were allowed to dump it to ground. That was an EPA-approved scientific test.

I have pictures of the water loop. It is not there anymore. It was a revolutionary type pump we were testing. I also have a picture of what happens when a valve goes the wrong way during a pressure test - you blow the side out of the building. That was building 4013. We blew part of Building 4013 clear over to SCTI with the failure of that valve. That photo was from May 4, 1989.

At the earthquake test facility (Building 13) we could put a million and a half pounds of compressed pressure on top of the facility and we could squeeze it and we had a table underneath with rubber isolators. In fact most of your buildings and bridges sit on rubber isolators now. We could run tests on the building to see how it would respond to potential seismic events. The floor of that building is 10 feet thick, 40 feet long, and 20 feet wide, with 2 inch rebar every square foot. They poured continuous concrete for 2 days. Everything had to be bolted to the floor for testing and measurement.

We used to do to conduct check valve tests using a bowling ball. We took a bowling ball, cut it in half, filled it with lead, put it back together, and we had it in plastic piping and did high flow testing with it.

We would take the tops off buildings to remove pumps from the buildings. The roofs weighed 29,000 pounds. I was in charge of the crane that had to remove the roofs and pumps. I was certified to operate and train others on cranes. The crane sits on a 100 foot high building and it has a 125 foot boom. It could pick up 180,000 pounds. After the sodium pump was tested, they had to pull it out. Sodium reacts with the moisture in the air so they had to lift it out in a bag. I was only operating the crane in the example, but they had a sewing machine in the building and they sewed a bag around the pump and they were lifting it out and filled it with nitrogen as they were pulling it out. The sodium pump weighed about 70,000 pounds and the clearance between the pump and the pump case was less than 0.25 inches. Handling the crane was pretty delicate business.

I thought some of the people up on the hill were some of the neatest people to work with. If you kept your mouth shut and just listened you could learn so much up there. It was so much fun working there. We were always doing something different. It wasn't boring. You had to know what you were doing all the time. It was a lot of stress too though because if you didn't do something right, someone could get hurt.

The average test took 16 seconds in the earthquake building. We had earthquake data on computers that we could replicate and alter as we wanted. The littlest earthquake that we replicated was 6.7 on the Richter scale. The highest was 25 times that. It is fun to see what happens to pipes under those conditions. The pipes would be filled with oil so I had oil all over my facility, but it never got out of the facility. We would go clean it up with soap-based detergents. We developed engineering data at that building. You can over support something. You are better off letting pipes move that attaching them too rigidly to a wall because if the wall moves one way and the pipe moves another, pretty soon you could have a bang. We wrote a lot of books up there using our test data.

Going back to your concern about radiological issues, I just didn't have much to do with that when I was up on the hill, only in the form of transporting packaged material.

I estimate that about 1,700 people worked in Area IV at one point. There were a lot of 24 hour operations running 7 days a week, such as at SCTI. I went nine years without having a Christmas because I was working. It was good money, but those shifts were hard.

If I had money and they let me I would build a house up there. I would have no problems living up there. There are some beautiful views.

There is probably some surface contamination still up there. And they are trying to get rid of it the right way. But you have Barbara Boxer and a few other people involved. I'm tired of all the "numnuts" causing problems up there. They are egotistical and think they know more than the people that worked there. They are paid advocates looking for deep pockets so they can ride the wave. Barbara Boxer couldn't make a decision if she had to. They cleaned up the site by the rules at the time and sent all the contaminated waste off site. Give them a set of rules and they will do it. But whose rules are you supposed to do it by? I went to one of those public meetings in the hotel and the first 2.5 hours were people talking about their education. I don't care about that. When they finally started talking about their findings, they were talking at a level above so many people that no one knew what they were talking about. You had people from Van Nyes over at that stupid meeting all worried about getting sick from the site and these people are making them even more scared. Talk *to* the people, not *over* them. I get very upset about that, if you can't tell. They are inciting fear and that is the wrong way to do things. You want to relieve the fears of the people. They have a right to know the truth and you should darn right tell them, but tell them at a level they understand.

Everyone up at the site worked extremely hard with lots of oversight to clean it up properly. But right now if one person doesn't like the outcome of something he or she is going to make a big deal to get the work done over again and get another opinion. It's like doing a curve fit, you can take data and make it come out any way you want. You can do that with these interviews you are doing – make them turn out any way you want. People get so technical that it raises concerns right away. You just have to do your job and talk to people in a way they can understand. There is always someone who will not be happy and swear up and down that they didn't get the truth.

I had one of the biggest sodium fires in the history of SCTI up there. One of my operators came in and said "I think we have a problem." We were at 35 megawatts of power throwing 3 million

pounds per hour of water flow going out to make 900 degree superheated steam, which reacts with sodium and I had sodium sitting out on the floor of the building about 3 feet high and 6 feet wide in little cones, just drip, drip, dripping. We ended up isolating the sodium and coating it with calcium carbonate to starve the oxygen and put out the fire. It cools down and gets a crust on it.

Talk to the operators if you want to know about lots of buildings. The engineers tended to stay in one place, while the operators moved around. Wherever the test was the operators followed. We had 100 or so operators at one time. When I left there were only about 20. They would go from one facility to another. Sometimes you would work at one place for a while, like I did for nine years at SCTI, and then sometimes you would only be at a place six months depending on the duration of testing.

We had this Ph.D. physicist. She was a neat gal, so smart. She wore pants and it just blew everyone's minds. This was back in the days where women didn't wear pants. But they needed her and there wasn't a thing they could do about it. She started the trend of women wearing pants up on the hill. That tells you how long I worked there. At one time you could walk out of any building at any time of day and walk into a herd of deer. There were also mountain lion, bears, raccoons, badgers, and rattlesnakes up there. I made a lot of money on rattlesnakes. I made belts. It's all sandstone up there and there are sandstone pockets that fill up with rain water and the animals would use it during the summer for water. I had a friend who was security guard up there and saw a mountain lion and her baby, as well as bears, walk through the gates.

We would go scrounging for parts in old buildings. I walked up a loading dock one night looking for parts and as I went up a badger came out and started chasing me. The only thing worse than a badger would have been a bobcat. I've walked into buildings with bobcats before and when that happens you just leave.

The Rocketdyne pond was stocked with fish so there would also be blue heron and storks and other birds up there as well. And sometime if it rained really hard, the fish would come out of the pond into the spillway and we would have to go pick up the fish and put them back in the pond. I never saw any dead animals that would have resulted from contamination. They fared better up there a long time ago then they do now.

Interviewee 4

I have a degree in mechanical engineering. I began working at SSFL in June of 1961 for Rocketdyne at Component Test Labs (CTL) 2 and 3. I did not work at Area IV. I was laid off by Rocketdyne in 1969. I was responsible for testing turbo pumps at CTL. I thought there may have been a retention pond at CTL 1 on the Rocketdyne side.

I worked for Atomics International following the lay off in 1969 from the DeSoto facility. In 1987, I was back on the hill in Area I at the Advanced Propulsion Test Facility.

In 1992, I returned to Rocketdyne and worked at the former Hot Lab until 1994. I was a supervisor at the Hot Lab and did not handle any radiological waste. I developed instructions for decontamination and decommissioning operations for the Hot Lab. I prepared the lab to be torn down and was responsible for cleaning the Hot Lab. I think that waste was shipped from the Hot Lab to another facility and then shipped off site for disposal. I don't remember where that temporary storage facility was located since that wasn't my responsibility. Perhaps the waste was stored temporarily at the Sodium Reactor Experiment (SRE). I think there was a concrete pad outside the Hot Lab for staging drums.

My main purpose in wanting to be interviewed was to pass on the following information. I was at a local bar and an "old time Simi Valley resident" was talking about Rocketdyne. The man had a garage and had found some cleaners (containing trichloroethylene) close to the SSFL fence line. He took the cleaners back to his garage to use to clean auto parts and then dumped the cleaners along a fence to kill weeds. I had read an article about contamination found off the hill and wanted to pass the information on as a potential source of this contamination. I don't really have any more specifics in terms of where the cleaners were found or dumped.

Regarding the accident at the SRE, I was told by a co-worker that a gentleman had asked him some questions regarding the severity of the accident at the SRE. My co-worker did not provide the gentlemen with any information so the gentlemen left assuming the worst of the accident. I think this lack of information was incorrectly interpreted.

Interviewee 5

I began working as a research engineer at Atomics International in January 1958, right after I graduated from college. Atomics International was a division of North American Aviation, Inc. I became the responsible engineer for the KEWB (Kinetic Experiments on Water Boilers) program within approximately a year of beginning work at Atomics International. As the responsible engineer, I was in charge of operations at the KEWB. I was one of three operators that ran the reactor. The Kinetics Experiment Water Boiler (KEWB) reactor was a water-boiler type reactor. The originally designed reactor was a - solution fueled reactor designed for university research. It was a steady-state reactor and was very low powered, 50 kW. The purpose of the KEWB program was to demonstrate that the reactor was completely safe and that anything they could do to it in a college environment would be safe. We would run tests to try and simulate the worst kinds of accidents we could imagine and the reactor would always shut itself down as a safety feature. All of the experiments we did were designed to test the safety of the KEWB reactor. KEWB was used solely for safety demonstrations. Subsequent to the KEWB program, we used the reactor as a pulse reactor for pulse neutron radiation experiments.

We ran the KEWB reactor down to a 1 millisecond reactor period. So for every millisecond that the reactor was supercritical the reactor power would increase by a factor of e (i.e. 2.1714). We got up to a power of 4,000 MW. This was a very short burst of power because the reactor would shut itself down as its inherently safe designed was supposed to do. After each power burst we would have to reset for the next tests, so we only did two to three experiments a day. This was to demonstrate the safety of the reactor and show that it would shut itself down under any kind of accident condition. We pulled all of the control rods out and let it go, but in a very systematic manner. We started our experiments very slow and then built our way up. That type of information would be documented in serialized log books and bimonthly reports. The log books were kept in the building, but I don't know where they went after I left. But they should have been tracked. There were also bimonthly reports that were issued and went into the AEC report system. Oak Ridge used to have a repository for these reports. All the tests would be documented in these reports. I don't know what happened to the log books. But I would look at Oak Ridge for archives. At one time ORNL had the archives for the AEC. We gave a couple of reports to ANS also. I gave a talk in the 1960s to the ANS.

There were radioactive gases and liquids associated with KEWB. The KEWB did generate fission gases. The fission gases were held in an underground storage tank and then vented up a stack after a decay period. The only contamination that might still remain from that would be in the underground storage tank. I don't know what the status of the underground storage tank is after D&D. I don't know if the tank was dug out during the D&D process or not. We had fission gases that were generated and sent to the underground tank. Then we had argon-41 that was generated in the reactor vault, but this

was not held in the underground tank, it was just vented up the stack. We would have to ventilate the room anytime we had to do work in the reactor room because of the radioactive argon gas. The fission gases were held in the underground tank and decayed for a while and then slowly bled out the stack.

The reactor fuel was liquid, uranyl sulfate. The coolant was water. There were cooling coils. I think the coolant was recycled. There was essentially no radioactivity in the coolant and none was discharged to the environment. There were two different reactor core vessels at KEWB. The first was a 12-inch spherical core that used highly enriched (93%) uranium, U-235. There was a stack on the reactor that was an overflow chamber. When we pulsed the reactor, gas would form and it would expel the fuel solution up and it would become subcritical. That was the shutdown mechanism. The solution would go up the overflow chamber on top of the reactor. It would get caught and then slowly drain back down. The control rods were reinserted before the reactor could become critical again. The fuel was fully enriched U-235. It would get fairly radioactive. There was a fuel and gas handling system for the reactor located in an adjacent room in the KEWB Building.

The stack ventilated the building, itself, and discharged the fission gases. The bermed area on this historical photo was where the reactor was located. There were three rooms in the concrete vault below grade. One room was the reactor vault, one room was the valve control room, and the third room was where the gas holdup tank, liquid drain tank, and associated plumbing were located. There was a hydrogen recombiner located in that room as well that we ran a few tests on. The radiation level in the fuel and gas handling room became very high. We hardly ever went into that room. The fuel would end up there and the piping would get highly contaminated.

The reactor itself was in a separate room. It was a 12-inch spherical reactor with a 3-foot high chute on the top. When the fuel was drained out of the reactor it went into the below-grade drain tank. We also had precipitate material in the lines and we did some chemical flushing to try and recover the precipitate material. That process generated a lot of liquid that ended up getting stored in glass carboys. We would flush the pipes and drain the rinse into the carboy containers. The containers were stored outside Building 4123 across from the KEWB reactor building. Building 4123 had two underground cells or holes in the ground - two concrete-line holes in the ground. And over in that area is where we stored all those bottles of liquid. Did some of it leak out onto the ground? Probably some, I would guess, but probably not a signification amount.

Halfway through the KEWB program we changed the reactor vessel shape. We took the original 12-inch spherical vessel out and replaced it with a 12-inch cylindrical vessel. We cut the spherical vessel out and stored the reactor in Building 4123, which was a storage building designed for holding the reactor vessel. It was highly radioactive, highly

contaminated. We all received significant radioactive exposures, getting our yearly dose just taking that spherical vessel out and moving it to storage. We were working right on the reactor vessel with our latex gloved hands. I don't know anything about the D&D program for the KEWB reactor because that occurred after I left. The KEWB reactor did run as a pulse neutron source for a while. There are vents located in the bermed area of Building 4073, which were the vents that allowed us to draw fresh air into the building and blow the argon gas out of the stack.

Building 4123 was the building that the reactor core was stored in so that is an area that you would want to look at. That would be the most likely area to look because anything that was hot in our area was stored there.

I was the project manager on the SNAP 8 Development Reactor in Building 59. The SNAP 8 Flight System Test was supposed to be in Building 56, but that was never built, it was just a hole in the ground.

Based on looking at the site map, Building 4123 is the location where the first KEWB reactor was stored underground. Building 4073 is the underground KEWB reactor cell, Building 4793 is the instrument building and Building 4643 is the stack/blower for Building 4073. Building 4093 is the AE-6 reactor. Building 4083 is probably the KEWB office building and Building 4103 is the control building.

The primary thing that went in Building 4123 was the first KEWB reactor. I'm sure some of that liquid that we drained out from flushing the pipes was probably stored inside as well, although most of it was stored outside the building. One thing I would look at is the underground part of Building 4123 because I don't know what they did with it in the D&D process. Building 4123 was not very big, maybe 8 feet by 8 feet or 8 feet by 10 feet. It was a small building. It was strictly a storage building and was built specifically to hold the first KEWB reactor when it was removed from the reactor building. There were two below-grade, concrete-lined cells. The cells were cylindrical and about 2 feet in diameter. Because the reactor was maybe a foot in diameter, the 2-foot diameter cells held the reactor vessel easily.

An incident report (A0504) associated with the KEWB reactor building noted that between April 1 and June 30, 1961, a research engineer received quarterly exposures to gamma and neutron radiation at levels greater than 3 rem. This occurred while conducting core experiments required for termination of the KEWB program and resulted in high radiation in the reactor room. The engineer was aware of his high cumulative exposure in early May, but because of the importance of the tests and lack of other qualified operators, he continued to conduct "unreflected" core experiments without prior approval to exceed the 3 rem quarterly limit. That incident report is referring to me. I was that research engineer referenced.

We used hand held dosimeters and wore film badges. We had pencil dosimeters to monitor our exposure during operations. We hardly ever went into the reactor building alone, only if we had something very quick to do that was relatively simple. Anytime we went in to manipulate the valves for the gas or liquid handling system we always had two people.

We did very little on-site storage of waste. I mentioned the first KEWB reactor vessel and the rinse solution, but there was little else. The reactor vessel stayed on site until the area was decontaminated and the rinse solution was eventually taken to RMDF. I would look at the D&D report for the area to gather more details.

The spherical KEWB reactor vessel was probably packaged and moved to Building 4123 without being decontaminated. That would be my guess, but I am not positive. The D&D report would probably give more specifics.

We had some usual things happen while running our experiments, but nothing I can think of that would lead to radioactive spills or contamination. Our approach with experiments was to start very small and increase incrementally. We would try to predict the results of the next step, and if we were unable to correctly predict the results of the next test, we would regroup and try to figure out why our prediction was not met. A few times we missed significantly on a prediction. The issue was one of neutronics. The KEWB reactor ran on thermal neutrons, and there are delay groups associated with the neutrons. Some neutrons are generated instantly and some are generated with a small (milliseconds) delay. We ended up discovering a new neutron delay group.

When we ran slow experiments, the neutrons went out to the reflector and were reflected back. As we went faster and faster, the neutrons that went out into the reflector were not reflected back before the pulse was over with and the reactor was already shut down.

We measured the energy level of the pulse and plotted it as a function of reactivity. It was basically a direct relationship, a straight line on a graph, except when we started getting these neutron delay groups. We were "running away from the neutrons" and that caused a change in our measurements from what we were predicting. We finally realized that we were "running away from the reflected neutrons" and that's what was causing the change from our predicted outcomes. So we discovered a new neutron delay group, the fast neutrons from the reflector. We had seen this before in other thermal neutrons at lower power and reactivity levels, so we started to see some similarities in our measurements and realized we had a new group. So this was an example of an unexpected occurrence. But in this example, when we first saw that our predictions were not being met, we stopped to try and figure out what was going on before continuing our

experiments in the same manner. We wanted to have an explanation for the unpredicted results that we were satisfied with before we continued on.

We used sulphurous acid, H_2SO_3, once over a period of a few days to chemically flush the plumbing lines at KEWB. We had a chemist that worked on the program at Canoga Park. We called him the "Mad Chemist." It was a fairly dilute solution. The whole idea was to dissolve fuel that had precipitated out into the gas lines or other lines. The acid also took off a bit of the steel from the piping. We were tense when we flushed the lines with sulphurous acid because the 1/8" drain lines coming out of the 1/4" piping were getting plugged up and it wasn't draining fast enough. We didn't want the sulfurous acid to be in the system very long so we wanted to get it out fast. I never did learn exactly what caused the plugging of the lines. We had to go into the gas handling room that was highly contaminated to unplug the drain lines. We went in very quickly and closed the valves and cleaned out the drain lines with a wire. The drain lines went into the glass carboy containers so that is where the rinse solution was contained. We got our gloves contaminated on that work. We would take our gloves and overalls and anything contaminated from our work on the KEWB and throw the items in the radioactive waste. We were a good customer of the RMDF.

As I recall, we never had a spill outside the building, but I would check the area at Building 4123 where the glass carboy containers were stored outside. I think it would be prudent to reexamine Building 4123.

We did other flushes of the system, but not with sulphurous acid. The only time we had trouble with the drain lines plugging was with the sulphurous acid. We did some other water rinses maybe once every 6 months or a year, but we didn't rinse the system very often.

The reason we had to flush the system was because when the reactor was pulsed and the foam solution that included the liquid uranium fuel would rise in the overflow chute and it would splash and go into the gas piping. We were trying to recover the fuel, which is why we used the sulphurous acid. Using the sulphurous acid was a one-time situation. It was driven by material accountability. Since the fuel was highly enriched uranium, it had to be fully accounted for. Every so often we would have to calculate the amount of uranium in the core and things like that. We discovered that we had to add a little bit of fuel and our calculations weren't finding all the fuel. That's when we realized that a small amount was splashing into the gas lines. So our calculations of fuel in the core were always a bit low because some of the fuel was in the piping. So then we got into discussion about how to recover the fuel. We talked to "Mad Chemist" and came up with the idea to use sulphurous acid to recover the fuel. The fuel was recovered, but was not recycled. It was contained in the carboys. The first couple of carboys were pretty hot and went to the RMDF. We flushed the system pretty heavily to make sure we got all the

sulphurous acid out, so we generated a lot of liquid waste from that process. The carboys were stored temporarily at Building 4123, but eventually it was all sent to RMDF.

At Building 4123, some carboys, the "hotter" ones, were probably stored in the building. But most were stored outside on an asphalt pad on the southern side of the building, near the road. I am not sure how long the bottles were stored here. That would be something log books would be able to tell you. The draining occurred before the spherical reactor vessel was removed, so it would have been sometime in the early- to mid-1959. I don't think you will see any residual contamination from this area, but it would be something to look at.

As a test facility, we documented everything since we were testing for safety of the reactor. We didn't have much company training back then. Training was on-the-job. We did a lot of on-the-job training and that was a good way to learn. There were some general company policies that dictated our work, but they were pretty broad. We had an HP stationed with us all the time. His office was next to mine. He covered us and the AE6 reactor building. The HPs took a lot of training and we looked to them to help guide our work. Whenever we went into the reactor building for any purpose, whatsoever, we wore shoe covers, lab coats, and gloves. When we went in to do any work with radioactive material we wore coveralls, coveralls, gloves, gloves, respirators, etc. We would double up on protective gear. We were all very safety conscious.

I had one personal incident. We had to measure the liquid level in the reactor. To do this we dropped a dip wire in a stand tube and watched the conductivity meter to know when the circuit had been closed. The probe was covered in tape and we would cut the tape at the level our meter indicated so we could measure the length of the dip wire and calculate the height of the liquid in the tube. One time I was cutting the tape with an Exacto knife and I had my finger behind it and I nicked my finger. I cut through the rubber glove. The tiny tip of the Exacto knife chipped off and I got a sliver stuck in my finger. It was radioactive. I went to the nurse and she didn't want to touch it at first, but she finally removed the tiny chip. The HP got his meter out and checked me, smeared me, and swabbed me and I was clean. After that though we changed the way we cut the tape. We eventually modernized our measurement techniques.

Everyone was pretty safety conscious on their own. We were all highly educated and knew about the hazards, but we were also running experiments and learning. We didn't depend on unskilled workers. All but two people were college graduates, most with physics or engineering degrees. We had a reactor technician and an electronics technician that were not college graduates. My boss was a Ph.D. There were basically two of us that ran the reactor, and then sometimes my boss would run the reactor once in a while.

There were no restroom facilities in Building 4073, so nothing was drained down any toilets. We used the AE-6 building restrooms. The general rule was that once anything was inside the fence it stayed there. I don't recall any problems with underground sumps, pumps, tanks, or piping. I can't recall any leaking tanks or pipes in our system. Most of the piping was welded, stainless steel.

I am aware of the sodium burn pit, but I can't give you any information on it. I know it was there, but that's about it.

The concrete pad located west of Building 59 is where we took the Building 59 reactor vessel and steam cleaned it. We were doing a non-nuclear check of the coolant system, so we filled it with NaK and heated it up to 1,200 and 1,300 degrees Fahrenheit. When the welders put these systems together they use Kotex to stuff in the piping because they were running argon gas on one side of the piping and they didn't want it all to rush out the side they were working on. So they stuffed Kotex in the pipe to keep the gas from escaping. A welder forgot to take the Kotex out and it was welded into the pipe. We couldn't get any fluid flow from the pipe when we were running our non-nuclear test, so we cut the pipe out and quickly saw what had happened. We put the whole setup out on the concrete pad and took the steam cleaner to the setup and cleaned it out. We got a big bang when we cleaned the system because even though most of the NaK had been drained out, there was residual NaK in the Kotex. We used Kotex in the KEWB for cleanup. It worked pretty well. We ordered it by the carload. It made a great absorbent. There was no radiation associated with this event, it was strictly non-nuclear testing. And after the NaK exploded the vessel was perfectly clean, so the explosion got rid of the NaK. We swabbed it out and reinstalled the vessel in Building 59 and it ran as a reactor vessel later for 10,000 hours.

In addition to being the responsible engineer at the KEWB, I was the project engineer for tests in Building 59. I didn't run the operations. The project engineer was like a program manager, so I wasn't there on a day to day basis. I can't recall any radioactive leaks in Building 59 when I worked there.

Building 10 was a SNAP test facility. The SNAP 2/10 reactor was tested first in Building 10 and then it was moved and they tested the SNAP 8 reactor. The SNAP 8 reactor had a containment vessel, which was a steel vessel probably 4 feet in diameter and 20 feet long, and below grade. It had cooling coils on it because those reactors ran pretty hot. During the testing of the SNAP 8 reactor, the cooling system for the containment vessel developed leaks and so we built a Bar's Leak injection system. Bar's Leak was a radiator sealant. It was some kind of sodium solution product. We injected that into the cooling system to plug up the leaks and it did. There was residual sodium in the cooling system and it became radioactive. I suspect there may have been some contamination from

leaks, but I don't have first-hand knowledge. I was the project engineer for that test. I didn't run the reactor.

There should be a fair about of documentation on the KEWB. I would look for bimonthly reports, topical reports such as D&D reports, ANS talks in the late 1950s and early 1960s, and log books.

Interviewee 7

I worked for Rocketdyne/Boeing from January 1987 to March 1999 in a few different locations. I started as a member of the technical staff (MTS) IV. I was a quality engineer throughout my 12 years. I was a quality assurance engineer auditor at first and then I became a lead auditor. The first four years I worked at Rocketdyne I audited Certified Special Processes, meaning that I audited our suppliers and vendors. Our suppliers and vendors provided us with parts and components, but we also had vendors for dry film lubrication and plating. I recall auditing a lot of plating shops. Some of those shops were extremely dirty with strong fumes. This work was for space shuttle main engine (SSME) and expendable launch vehicle (ELV) programs.

I spent intermittent time at the SSFL from June 1991 until September 1998.

From June 1991 until May 1993, I was based at the Plummer facility. During that time, I infrequently visited the SSFL as part of my work duties. I was a quality engineer and we supplied Hydrogen Recombiner spare parts for nuclear power plants. Most of my activity was at Plummer, but we did store Hydrogen Recombiner parts on the hill for a period of time so I would sometimes have to go up to find answers to customer questions related to those parts. I don't recall the building number where the hydrogen recombiner parts were stored. I was up and down the hill infrequently, and usually in Area IV during this time period.

Then from May 1993 to September 1998, I was stationed at DeSoto Building 105, but that is when DOE was doing decontamination and decommissioning at SSFL. DOE was tearing down buildings in Area IV, clearing them out, packaging things in boxes. So I performed quality auditing of the hazardous waste packaging on the hill. I worked out of the Radioactive Material Handling Facility (RMHF) as the quality auditor of hazardous waste material. The boxes of material were big, approximately three feet square. My job was to verify that what they were taking out of the buildings and putting in the boxes was correctly stated in their documentation. The boxes had identification numbers for tracking and I made sure that the box ID and contents matched the shipping documentation and quality control records. Our office was in the RMHF, but what I think was Building 9 was an open-ended building with only a roof. That's where I was checking the boxes. There were rows of boxes piled up on top of each other. I had to go up and down the aisles, and crawl around to find the correct boxes. I didn't have to wear any protective clothing, but I did wear a film badge. I got a report from Rocketdyne/Boeing that had my film badge records. However, the only dates they had for me were from February 1996 to September 1996. I think I wore a film badge for work that I did from 1995 into 1997, so I can't give you exact dates because I only have the record from Rocketdyne/Boeing for 1996. The report also lists my primary work

location at SSFL was T034 and T020 in 1996. But I think I was up there beginning in 1995 and up to 1997.

Boxes were piled in the open-ended storage building, what I think is Building 9, west of the RMHF and the enclosed building attached to Building 9 (which appears to be Building 4075 based on the site map). There was also another building across the street that held boxes (which appears to be Building 4621 based on the site map). I am not exactly sure of the building numbers. But when I was auditing at RMHF, I was actually working out of four buildings, the RMHF, Building 9, the building next to Building 9, and the Building across the street. A little west of these RMHF buildings was a burn pit. I didn't have anything to do with the burn pit, but I could see it while I was in the RMHF area. I could see smoke from the burn pit. I don't know what they were burning, but sometimes we could see smoke.

I wasn't auditing at the RMHF every day. I would go up and conduct an audit of the boxes they had for two or three days and then wait for them to ship the boxes out and get new boxes ready for us to audit. I did that for about two years.

I was also in the Rockwell International Hot Lab (RIHL) once. I don't recall wearing a film badge at the time. We would get calls from customers and I would have to investigate and track documentation for Hydrogen Recombiner spare parts. Sometime the requests would be for parts, or documentation on parts. Other times a request required me to verify a part number or something like that. I was in the Hot Lab only once to handle a customer request. They were in the process of tearing the Hot Lab down, but the glove boxes and robot arms were still in place.

I think I wore a film badge from 1995 to 1997, but Rocketdyne records exist only for 1996. I did not have to handle any radioactive or chemical waste material. It was all boxed up and covered. I just verified the documentation. I did not unwrap anything in the boxes. We had to verify the shipping list with the box description. I think the boxes were ultimately shipped to Nevada for disposal.

I never saw any spills or accidents. It was pretty quiet while I was there. I don't think Rocketdyne, DOE, Boeing, or anyone did anything wrong. We were monitored and wore badges according to the standards of the time. You don't know if the standards were accurate. I have collected articles, such as this August 28, 2007 obituary from the L.A. Times for John Gofman. He was a physicist that warned about radiation risk. He worked at Lawrence Livermore National Laboratory. In 1969, he and his colleagues had data showing the risks associated with low doses of radiation were 20 times higher than stated by the government. They published the data, lost their funding, and were fired from the lab. Most of their conclusions have since been validated, but critics say the risks have been ignored by the nuclear industry. This article wasn't worth much to the Department

of Labor and my health claim. But that's what I was working around, low-dose radioactive materials and I ended up getting cancer, so I just wonder about the connection.

I filed an EEOCIPA claim and after about three years of going back and forth with it, my claim was denied on October 21, 2009. That's why I have collected so many articles, for my health claim.

I don't fault Rocketdyne, Rockwell International, or Boeing. At that time we were working under the established standards. I just wonder about the standards and if they were safe enough.

We also did work on Solar Two from 1995 to 1996. It was an electric power program that used mirrors to reflect sunlight and heat up sodium. You can see the tower now when you drive by on the U.S. 40 or I-15. I have a video describing the program called "Solar Two – Power from the Sun" dated March 5, 1996. I was at that job site and am on this film very briefly. We had to do the hydrostatic testing of the components with an American Society of Mechanical Engineering (ASME) code inspector present, which may have been why I was up on the hill then, but I can't recall. The system tubes and strongbacks that the sodium would have to go through would have to be tested to make sure there were no leaks and they could meet temperature and pressure requirements. We did some of the fabrication work for the Solar Two power project on the hill. I don't recall the building number where the fabrication work took place. I visited the hill for this project, but I did not wear a film badge. I don't recall if we were near any radioactive facilities, but we were on the hill in Area IV. I would have to go up and verify materials and tests witnessed by the code inspector. Also, I was the liaison between the fabricators and the suppliers and would have to do investigative work to answer any questions about materials or supplies that arose. There weren't any radionuclides associated with the Solar Two project. The nuclear association was that they were fabricating parts in a building up in Area IV. They may have done this simply because they needed an area with enough space to work in, I'm not sure. This project probably occurred before I did the low-level waste auditing at the RMHF.

I wasn't aware of any spills or accidents. I don't know of anything that was disposed on the site. I didn't work with any radionuclides, just the low-level waste that was already packaged.

Rocketdyne moved us all over the place. That's what they didn't understand when I filed my health claim. They gave me credit for my time on the hill when I was based in DeSoto because I was doing DOE work, but they did not give me credit for time on the hill when I was based out of the Plummer facility. It didn't seem to make sense that they only credited me for part of my time on the hill. I worked with EEOCIPA, DOE, DOL,

and NIOSH on my claim, but after three years and their calculations I didn't get anywhere and my claim was denied.

Anyone who worked at Rocketdyne could get up on the hill. They had guards at the gate, but all you had to do was show your Rocketdyne badge and once you were in there you were free to go to your destination. I was in and out of a few buildings for various meetings or to check on parts, but I spent most of my time associated with the RMHF area and adjacent buildings.

Company policies dictated how I did my work. As a certified lead auditor I went to a lot of nuclear vendors, including the DOE lab in Las Vegas. I would conduct audits of our vendors and determine if they were following all the required procedures and specifications. I would also have a technical auditor with me who would know more about the technical side of the work. We had to put the vendors on our approved supplier list. I wrote procedures and checklists. The very last job I had was working with Purchasing at Canoga on procurement inspection procedures (PIPs). We would define what we wanted checked and how we wanted it checked and then categorize the items based on importance. I did this the last nine months before I retired.

I started at Canoga, worked at the Plummer facility and went to the SSFL, worked at DeSoto and went to SSFL, then went back to Canoga.

As an MTS IV, I had a background in mechanical engineering and work experience in industry. I did have radiation safety training at Rocketdyne. I was a certified special process auditor because I knew how to write procedures and do quality control auditing. I was knowledgeable in non-destructive testing procedures, including radiography, ultrasonics, magnetic particle testing, liquid penetrant testing, etc. I was level three in all of those so I could train others to do the work. As an auditor, I would make sure other programs and vendors had their training set up properly and they could show me proper documentation of training.

We had to have a storage location to keep track of quality control records. We had to keep very strict records for the nuclear side of things. The last I knew, all of my records as an auditor were maintained at the DeSoto facility.

I didn't handle any waste. I didn't have to wear any special clothing or equipment. I didn't notice any problems with the buildings I worked in with regard to plumbing, tanks, sewers, etc. If I had noticed something was wrong I would have reported it for sure. That was what I used to do as a regular part of my job as an auditor.

I know there were contractors doing the decontamination, decommissioning, demolition, and cleanup at the site. I think the non-destructive testing may have been done by subcontractor, Boothe-Twining. They did work all over southern California.

I can't think of any special concerns I have at the site. Like I said, I don't hold anyone responsible. I'm sure everything was done to the level it was supposed to be done at the time. Rocketdyne/Boeing was not lax. They had smart people working there and no one would have done anything intentionally wrong.